

## **REMARKS**

### **The Amendments**

Claims 1-13, 62-95, and 96-135 have been withdrawn. Claims 14-60 have been cancelled. Previously presented claims 136-167 are still pending.

New claim 168 has been added. Support for new claim 168 may be found in the description on page 16, lines 20 to 24, and page 17, lines 11 and 12. The feature of the grafted polymer having a degree of crosslinked character is also supported in the examples (see e.g., page 32, Example 2, (A)-2, "Generation of a hybrid polymer by grafting in a single solvent"), where the graft polymer has a degree of crosslinked character by virtue of it being formed from styrene and divinylbenzene.

### **The Claim Objections Have Been Remedied**

Claims 145-154 were objected to as multiple dependent claims that improperly depend from a multiple dependent claim. Applicants have amended claims 145-149 and 151-154 so that they no longer include this improper dependency. Therefore, this objection should be withdrawn.

### **The Present Invention Teaches a Solution to the Problem of Solid Support Collapse Due to Variable External Solvent Environments**

The present invention teaches a hybrid polymer that solves a particular problem not addressed (or solved) by the teachings of the prior art references cited by the Examiner. The problem is how to design a polymeric solid support that maintains the presentation and accessibility of functional groups on its surface in a changing external solvent environment. State of the art polymer supports are often highly sensitive and collapse due to changes in the solvent external environment. This collapse results in reduced accessibility of the functional groups on the support and leads to poor efficiency for the particular solid phase process in which the support is being used.

The prior art teaches using rigid supports as one way to minimize external solvent effects. For example, highly crosslinked porous polystyrene beads are commonly employed as solid phase supports. Despite providing some improvement in maintaining accessibility of functional groups, rigid supports are not well suited for a number of applications because they exhibit high heterogeneity of composition and concomitant slow and/or uneven reaction kinetics and therefore

often.

The present invention solves the problem of external solvent effects on polymeric solid supports by providing a hybrid polymer comprising a substrate polymer with one, or a plurality of, polymers having a combined thickness of less than 50 microns grafted onto its surface in pellicular formation, and importantly, with at least one of the grafted polymers maintaining the co-continuous character of the functional groups to an external environment. According to the teachings of the present invention, such a hybrid polymer support will maintain accessibility of the functional groups on its surface in a changing external solvent environment. Thus, the solid phase supports of the present invention advantageously provide for high loading capacities and may be subjected to a diverse array of external environments without compromising accessibility of functional groups to those external environments.

**The Rejection under § 102(b) Should Be Withdrawn Because US 3,849,172 (Chin *et al.*) Fails to Teach All of the Limitations of Claims 136-144**

The Examiner has rejected claims 136-144 under § 102(b) as allegedly anticipated by the Chin *et al.* reference (US 3,849,172). Chin *et al.* discloses an electrolessly metal plated plastic substrate with improved bond strength between the metal coating and the plastic substrate. The specification indicates that this may be achieved through use of vinyl pyridine monomer copolymerized with other monomers to form a terpolymer, or a vinyl pyridine monomer grafted on to an elastomeric polymer. The terpolymer or the grafted elastomer may be used alone or physically mixed to form a “poly-blend” in the electrolessly deposition process. Chin *et al.* fails to disclose a substrate polymer with a surface modified to facilitate co-continuity of functional groups to an external environment, let alone a polymer grafted onto that surface in pellicular formation having a combined thickness of less than 50 microns. Accordingly, the claims of the present application are novel in light of this reference and the rejection should be withdrawn.

**The Rejection under § 103(a) Should Be Withdrawn Because US 5,364,907 (Rolando *et al.*) Fails to Render Obvious the Limitations of Claims 136-144**

The Examiner has rejected claims 136-144 under § 103(a) as allegedly obvious in view of the Rolando *et al.* reference (US 5,364,907). Rolando *et al.* teaches poly-alpha-olefin base polymers having olefinic monomers grafted thereon that may be used for the immobilization of

proteins. Rolando *et al.* teaches that the grafted polymer should be present in an amount effective to increase the amount of protein that will bind to the graft copolymer as compared with the base polymer alone. The Examiner correctly points out that Rolando *et al.* teaches nothing regarding the specific thickness of the grafted polymer layers. The Examiner alleges, however, that “a skilled artisan would know what the maximized size limitation would be depending upon final usage.” Applicants respectfully disagree. Applicants believe the teachings of Rolando *et al.* lead one of ordinary skill away from a selection of a graft thickness because graft thickness has no sensible meaning in the context of this reference. Indeed, the reason why graft polymer layer thicknesses are not disclosed in Rolando *et al.* is because it is essentially concerned with grafting olefinic monomers to a poly-alpha-olefin based polymer using a reactive extrusion process. In such a process the poly-alpha-olefin based polymer is melt mixed with the olefinic monomers and the olefinic monomers are grafted throughout the bulk poly-alpha-olefin base polymer. Accordingly, in the context of the graft methodology taught by Rolando *et al.* there is in fact no meaningful thickness of a graft polymer at the surface of the base polymer that could be measured.

Furthermore, Rolando *et al.* makes no mention whatsoever of providing a substrate polymer with a surface modified to facilitate co-continuity of functional groups to an external environment. It is therefore submitted that the reference fails to suggest or lead one of ordinary skill to the hybrid polymers of the presently claimed invention. Accordingly, the claims of the application are believed to be nonobvious in view of Rolando *et al.* and the rejection under § 103(a) should be withdrawn.

**The Rejection under § 102(e) Should Be Withdrawn Because US 6,582,754 B1 (Pasic *et al.*) Fails to Teach All of the Limitations of Claims 136-144**


The Examiner has rejected claims 136-144 under § 102(e) as allegedly anticipated by the Pasic *et al.* reference (US 6,582,754 B1). Pasic *et al.* discloses a process for the manufacture of coatings on bulk polymeric materials, primarily coatings directed toward forming highly wettable, minimal protein fouling coatings for use in contact lens technology. Pasic *et al.*, however, fails to teach a substrate polymer wherein the surface has been modified to facilitate co-continuity of functional groups to an external environment. Accordingly, the claims of the present application are believed to be novel in the light of this document.

**CONCLUSION**

In view of the foregoing amendments and remarks, the Applicants believe that the application is in proper form and condition for allowance. An early Notice of Allowance is earnestly requested. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is encouraged to call the undersigned at (650) 463-8133.

Respectfully submitted,

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